

REMARKS

After the foregoing amendment, claims 1-5 and 8-17 are active in the present application. Claims 6 and 7 have been cancelled and claims 1, 3, 8, 9 and 12 have been amended. No new matter has been added by the amendment and the amendment is believed to place the application in condition for allowance. Accordingly, reconsideration and allowance of the application, as amended, are respectfully requested.

Claims 1, 4-8 and 12-15 have been rejected under 35 U.S.C. §102 as being anticipated by JP 05-36886 (Goto). Applicants respectfully traverse the rejection.

The present invention is directed to a multi-row leadframe. The leadframe includes a first row of terminals that, prior to singulation, are connected to and extend outwardly from an outer perimeter of a paddle ring. A second row of terminals surrounds the first row of terminals. The second row of terminals are connected to a connection bar (again, prior to singulation). The first row of terminals is also connected to the connection bar at a corner thereof. The paddle ring may include inner and/or outer projections that help mechanically lock the paddle with an encapsulant (see Specification, para. 29).

FIGS. 2 and 3 show the leadframe with the first row of terminals 32 singulated from the paddle ring 22 and the second row of terminals 34 singulated from the connection bar 78 (FIGS. 9 and 10).

Independent claims 1 and 12 have been amended to recite that "each of the terminals of the first row of terminals is individually connected to the paddle ring and extends outwardly therefrom", "each of the terminals of the second row of terminals is connected to a connection bar", and that "the inner row of terminals is connected to the outer row of terminals at a corner of the connection bar."

Goto discloses a leadframe having first and second rows of terminals 6, 7 that are both connected to a tie bar 8, and not to a paddle ring. More particularly, the terminals of the first row and second row are alternately connected to the tie bar 8, with the terminals forming separate rows because they extend different distances from the tie bar. The first row of terminals 6 is connected to pads 1a on a top side of a circuit with leads 3 and the second row 7 is connected to pads 1b on a bottom side of the circuit via wires 9.

The leadframe of the present invention, as claimed in independent claims 1 and 12 differs from the leadframe disclosed by Goto. According to the present invention, the first row of terminals is connected to the paddle ring and the second row of terminals is connected to the connection bar. The first row of terminals is also connected to the connection bar, but at a corner thereof. Every terminal of the first row is not connected to the connection bar, as disclosed by Goto. Hence, independent claims 1 and 12 are not anticipated by Goto. Accordingly, Applicants respectfully request that the rejection of claims 1, 4-8 and 12-15 as anticipated by Goto be withdrawn.

Claims 2, 3, 9 and 16-17 have been rejected under 35 U.S.C. §103 as being unpatentable over Goto. Applicants respectfully traverse the rejection.

Claims 2-3 and 16-17 are directed to the inner and outer projections formed on the paddle ring that are provided to enhance the mechanical locking of the ring with an encapsulant. As the Examiner notes, Goto does not disclose such projections. Actually, Goto is totally silent as regards such projections or any need therefor. As discussed in the specification, such as at paragraph 0029, the projections enhance the mechanical locking of the ring with an encapsulant. Thus, the projections are not a mere dimensional limitation. Rather, the projections are a specific feature of the invention provided for a specific purpose. Since Goto does not teach, suggest or disclose such a feature, Applicants submit that this feature is patentable over Goto.

Claim 9 is directed to another row of terminals connected to the other side of the connection bar for connecting to a second integrated circuit die. Claim 9 has been amended to positively recite the feature of the additional row of terminals connected to the connection bar. Claim 9 is believed to be patentable over Goto for the same reasons as independent claim 1.

In view of the above, Applicants respectfully request that the rejection of claims 2-3, 9 and 16-17 as unpatentable over Goto be withdrawn.

Claims 10 and 11 have been rejected under 35 U.S.C. §103 as being unpatentable over Goto in combination with U.S. Patent No. 6,005,286 (Kinsman). Applicants respectfully traverse the rejection.

Claims 10 and 11 depend from claim 1 and are believed patentable over the cited references for the same reasons that claim 1 is patentable over the cited references.

DOCKET NO.: SC11850HP

In view of the foregoing amendment and remarks, it is respectfully submitted that the present application, including claims 1-7 and 9-17, is in condition for allowance and such action is respectfully solicited.

Respectfully submitted,

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MARKED UP VERSION OF CLAIMS AMENDED IN REWRITTEN FORM

1. (Amended) A leadframe for a semiconductor device, the leadframe comprising:
a paddle ring having an inner perimeter, an outer perimeter, and a cavity located within the inner perimeter for receiving an integrated circuit die;

a first row of terminals generally surrounding the paddle ring outer perimeter, wherein each of the terminals of the first row of terminals is individually connected to the paddle ring;
and

a second row of terminals surrounding the first row of terminals, wherein each of the terminals of the second row of terminals is connected to a connection bar and wherein the inner row of terminals is connected to the outer row of terminals at a corner of the connection bar.

3. (Amended) The leadframe of claim [2] 1, wherein the inner perimeter of the paddle ring also includes a plurality of spaced projections.

8. (Amended) The leadframe of claim [7] 1, wherein the paddle ring is generally square shaped and the connection bar is connected to at least one of the terminals of the first row of terminals or the paddle ring at a corner thereof.

9. (Amended) The leadframe of claim 8, [wherein] further comprising another row of terminals [is] connected to the other side of the connection bar, said another row of terminals for connecting to a second integrated circuit die.

12. (Amended) A semiconductor device, comprising:

a paddle ring having an inner perimeter, an outer perimeter, and a cavity located within the inner perimeter;

a first row of terminals generally surrounding the paddle ring outer perimeter, wherein each of the terminals of the first row of terminals is individually connected to the paddle ring and extends outwardly therefrom;

a second row of terminals surrounding the first row of terminals, wherein each of the terminals of the second row of terminals is connected to a connection bar and wherein the inner row of terminals is connected to the outer row of terminals at a corner of the connection bar; and

DOCKET NO.: SC11850HP

an integrated circuit die placed within the cavity and surrounded by the paddle ring, the die including a plurality of die pads that are electrically connected to respective ones of the terminals of the first and second rows of terminals.